**UNITED STATES DEPARTMENT OF HOMELAND SECURITY
TRANSPORTATION SECURITY ADMINISTRATION
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**SUBCOMMITTEE ON ECONOMIC SECURITY,
INFRASTRUCTURE PROTECTION, AND CYBERSECURITY
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Chairman Lungren, Congresswoman Sanchez, and Members of the Subcommittee, thank you for inviting me to testify regarding the deployment of checkpoint and checked baggage screening technologies at our Nation's airports. With the summer travel season well underway and airline travel now exceeding the pre-September 11th levels, it is an appropriate occasion to examine the role that technology plays in support of our mission of screening passengers and property, in a manner that not only ensures security but also operational efficiency. By measuring the capabilities we currently possess against emerging threats, we are able to conduct the necessary research and development to support the next generation of technology solutions that will continually increase our capabilities, minimize staffing requirements, and improve the experience of the traveling public. An element of TSA's Office of Security Technology is our Transportation Security Laboratory (TSL) at Atlantic City, NJ. The TSL is the premier laboratory leading the way in explosives and weapons detection in support of protecting the transportation infrastructure. I invite you to visit the TSL at your earliest convenience, so that you can get a firsthand glimpse of some of the technologies that I will be describing today.

Checkpoint Screening Technologies

TSA's technology program is designed to provide the optimal tools to our screeners. For checkpoint screening, TSA's screeners conduct pre-flight screening of passengers and their property to ensure that they do not bring aboard a commercial flight any concealed weapons, explosives, or other threat items. The following are the tools currently deployed to support this part of our mission:

- 1,910 enhanced walk-through metal detectors: Designed to alarm when a metallic item of sufficient weight and density is detected, these alert screeners to the need to perform secondary screening to ensure that the item causing the alarm is not a prohibited item. After 9/11/01, TSA established a new standard for airport metal detectors and replaced the units that had been previously deployed.

- 1,904 threat image projection (TIP) ready x-ray machines: Designed to portray images of items being screened, these allow screeners the opportunity to use image interpretation to identify potential prohibited items. The incorporation of TIP into this technology allows TSA to randomly and covertly insert images of threat items into bags that are processing through the x-ray unit and measure screener alertness and effectiveness. As new threat concealment techniques are designed, TSA can design TIP images to educate screeners without removing them from their work station.

- 1,273 Explosive Trace Detection (ETD) units: Designed to detect traces of explosives particles, these provide screeners with a technology to assist in the clearance of items that cannot be cleared through x-ray and/or visual inspection alone. This is a particularly effective technology with regard to screening bags i.e., a suspected false bottom or lining that reveals evidence of tampering, as well as shoes and electronic/electrical items. The screener uses a collection media to obtain a sample for the surface of the object to be screened and submits that media for analysis. The unit will alarm if the presence of explosives particles is detected.

The effectiveness of each of these technologies is dependent upon screeners being alert and attentive to their duties 100 percent of the time and following established processes and procedures. For example, by definition, the use of metal detectors only alerts screeners to the presence of metallic objects, which would encompass most weapons and most prohibited items. Further, these devices alarm when detecting a broad array of metallic items, which then requires a more time consuming alarm resolution process to begin, to include use of hand held metal detectors to isolate the area of concern and a limited pat down search to identify and resolve the item(s) causing the alarm. X-ray screening requires image interpretation as bags process through the unit, allowing only seconds to make a decision. Therefore, screeners must not only be well-trained but also continually alert. Finally, the ability of the screener to obtain a proper sample is critical to the effectiveness of ETD technology.

Going forward, TSA's checkpoint technology research and development program focuses on overcoming the shortcomings of existing technology, especially through automation of threat detection. In addition to improving detection capabilities, TSA also seeks to develop technology that has a minimal "footprint impact," so that their installation or actual operations will result in minimal disruption to the flow of passengers and require minimal construction investments. TSA must also ensure that any technology that is introduced does not pose an unintended health or safety risk to passengers and/or screeners. Finally, TSA is mindful that with increased technology capabilities comes the responsibility for ensuring that such capabilities do not lead to undue intrusions into the personal privacy of passengers.

TSA has conducted operational testing and evaluation of two new technologies that will enhance TSA's ability to detect explosives at airport checkpoints. The first technology is Explosives Trace Detection Portals, designed to inspect passengers for concealed

explosives using non-contact trace detection as passengers walk through the portal. The testing revealed that the portal offers a viable first generation solution for explosives detection on people. With the successful completion of 14 pilot projects, TSA is planning to purchase and install 147 of these portal units in calendar year 2005.

The second technology undergoing testing and evaluation at four airports is a manual explosives detection document scanner. The four units currently deployed on a pilot basis require that a screener handle a passenger's travel document and pass that document across a designated area on the unit to obtain a sample for analysis for the possible presence of explosives. TSA has found that while the underlying technology is effective, we would achieve more effective results if the system were designed to accept travel documents directly from passengers. Such a direct approach would not only streamline the screening process but would also preserve the integrity of any traces of explosives that might be present. TSA is therefore continuing to work with technology vendors to develop an automated explosives detection technology that will include a document scanner and expects to have a prototype to pilot in FY2006.

TSA is also currently pursuing research and development on a number of next generation technology solutions to further expand our capability to detect weapons and explosives at the checkpoint. One technology that TSA finds especially promising is whole body imaging/backscatter X-ray technology, which would allow TSA screeners to visualize metallic and non-metallic items carried on persons without physical contact between the screener and the passenger. The device operates by producing an approximate body image that can highlight possible weapons or explosives on that individual without unduly infringing on personal privacy. TSA is currently developing an operational test and evaluation pilot project proposal for this technology, including techniques for protecting personal privacy. TSA is working closely with vendors to perfect software algorithms that would be incorporated into this technology to protect the personal privacy of individuals that would undergo backscatter screening. Simultaneously, TSA is evaluating other body imaging technologies, such as millimeter wave and terrahertz technology. We believe that if whole body imaging systems are successfully developed and deployed, with effective means to protect personal privacy, this technology could improve the secondary screening process and potentially minimize the necessity to conduct patdown searches.

In addition to whole body imaging technology, TSA has a number of research and developments projects underway to identify increasingly effective and efficient checkpoint technologies, including:

- Explosives Detection System (EDS) for carry-on baggage: TSA is conducting preliminary evaluations of an EDS for carry-on baggage that would automate the detection of explosives in carry-on baggage, similar to the capabilities TSA has achieved for checked baggage screening. TSA currently has one unit located at Boston Logan International Airport to collect engineering data needed to support further development of the technology.

- Cast and Prosthetic Device Scanner: TSA is working to develop a technology solution to more effectively screen casts and prosthetic devices for weapons and prohibited items.

- Explosives Detection Bottle Scanners: TSA is working with industry to evaluate the effectiveness of bottle scanners to screen for liquid explosives. TSA has issued a solicitation to industry to submit products for laboratory evaluation.

TSA plans to invest $28.3 million in FY 2005 and has requested $71.7 million in the FY 2006 budget for emerging technologies to begin to equip airports with additional explosives detection technologies for passenger screening.

The FY 2005 purchase and deployment plan for explosives detection portals and document scanners is outlined below:

FY 05 - $28.3M	# of Airports	# of Units	Cost Per unit *(does not include installation costs)*
Static Trace Portals	41+	147	$175,500

For FY 2006, the Administration is requesting an increase of $43.7 million, for a total of $72.0 million, to direct additional resources to field emerging technology equipment at checkpoints. As emerging checkpoint technologies continue to be developed, operationally tested, and evaluated, we will be able to determine which other technologies are appropriate for deployment.

Checked Baggage Screening Technologies

For checked baggage screening, TSA conducts pre-flight screening of all checked baggage that is carried on a commercial flight for the presence of explosives. Currently, TSA uses two types of devices to screen checked baggage for explosives: explosive trace detection machines (ETD) and explosive detection systems (EDS). ETD machines are roughly the same size as a common laser printer, with an average cost of $37,500. ETD machines can detect minute traces of explosive residue, which may have been transferred to surfaces through direct or indirect contact. While the ETD machines themselves have extremely high detection rates and very low false-positive alarm rates, the process for collecting trace samples is slow, very labor intensive, and susceptible to human error. ETD machines work best as a primary means of explosive detection at low-throughput airports and for alarm resolution when coupled with an EDS machine. As indicated earlier, this technology is also used to support screening at passenger checkpoints.

In contrast, EDS machines scan objects in bulk and compare their density to the density of known explosives. The EDS can be highly automated and networked and can scan several hundred bags per hour. Currently, TSA has deployed at our nation's airports over

1,300 EDS machines, which operate from a computed tomography (CT) technology platform, and all of which are manufactured by L-3 Communications Corporation or GE/InVision Technology, Inc. The greatest advantages of EDS over ETD are that threat detection is automated and their throughput rate is significantly higher. The EDS does produce higher rates of false alarms, and as a result, screeners must resolve those alarms by either using on-screen alarm resolution protocols, or by using ETD to inspect the item(s) causing the alarm. In addition, the current generation of EDS is generally large and bulky (weighing around 10,000 pounds and measuring on average approximately 24'x6'x6'). EDS units are also costly to purchase (as much as $1 million per EDS machine). Finally, to accommodate the size and weight of the EDS machines, some airport terminals require facility modifications prior to installation. Installation costs vary but average approximately $340,000-420,000 per unit.

Further efficiencies can be achieved at the Nation's largest airports if EDS is integrated inline with an airport's baggage conveyor systems. Inline screening solutions allow TSA to realize maximum efficiencies with regard to equipment throughput capacity. For example, a standalone EDS unit typically deployed in an airport's lobby will process approximately 150 bags per hour, while that same unit installed inline will process approximately 450 bags per hour. Unfortunately, facility modifications needed to support inline EDS screening solutions usually entail extensive terminal modifications— such as reinforced flooring, IT networking, electrical upgrades, new conveyer systems, and construction of new facilities.

To date, ten airports have moved to full inline screening systems. Many of these airports undertook this work using their own funds, funds from FAA's Airport Improvement Program (AIP), or some combination thereof. Since 2003, TSA has also issued eight letters of intent (LOIs), covering nine airports (of which one, Boston Logan International, has completed full inline EDS installation), to provide assurance of a multi-year funding stream for selected airports to make the necessary airport infrastructure modifications to accommodate installation of inline EDS. To this point, TSA has issued the following LOIs, which will be paid over several years subject to the availability of funding:

Airport	Total Project Cost
Denver International	$95 million
Dallas/Fort Worth	$140 million
Los Angeles/Ontario	$315 million
Boston Logan	$116 million
Las Vegas McCarran	$125 million
Atlanta	$125 million
Seattle/Tacoma	$212 million
Phoenix	$115 million

The Federal Government's total investment over the duration of the LOIs, at a 75% Cost Share Rate, would be $957 million.

The FY 2006 President's budget request includes $264 million to support the existing LOIs. This amount includes $240.5 million in direct reimbursements and an additional $20 million for equipment multiplexing and installation. The FY 2006 President's budget also includes $130 million for the purchase of EDS and ETD technology in support of checked baggage screening.

TSA is also developing prioritization criteria that will result in a comprehensive strategic plan in which TSA will identify the universe of airports that may benefit from an inline EDS system or other physical modifications to support the optimal screening solution. This plan will identify estimated project costs and potential savings that could be achieved through minimizing staffing requirements, capital investments and maximizing technology capabilities. It is important to note, however, that inline EDS systems are not appropriate for all airports, from both operational and cost considerations. For example, in December, 2004, TSA certified the CT-80, which is manufactured by Reveal Imaging Technology. This unit operates from a CT based platform similar to the current L-3 and GE/InVision technologies, but it only weighs about 3500 pounds and will cost approximately $350,000 per unit The Reveal CT-80 provides TSA with a smaller and less expensive EDS unit to include in its planning. At certain airports, the Reveal CT-80 may be appropriate to install as standalone units within and/or immediately behind airline ticket counters at airports. They would replace screening currently performed using ETD. For FY 2005, TSA has available for obligation $30 million to purchase and install CT-80s, of which about $25 million would be used to purchase the actual units and $5 million would be devoted to installation. Pilot testing of the units is already underway at Gulfport Biloxi Airport and John F. Kennedy International Airport (JFK) and will soon be initiated at Newark Liberty International Airport (EWR). The pilot testing will allow TSA to measure the operational impact associated with use of this new unit.

TSA's research and development efforts have also yielded a software upgrade that enhances the capability of the already deployed eXaminer 6000 EDS unit manufactured by L-3 Communications. This upgrade, known as the Analogic 6400, was certified by TSA in April of this year. The upgrade provides improved detection, increased throughput capacity, improved reliability, and reduced false alarm rates. TSA will pilot this technology at a number of airports to determine operational impact by the end of this year.

The Reveal CT-80 and the Analogic 6400 are concrete examples of incremental improvements in existing EDS technology to provide greater flexibility in identifying the optimal solution for a variety of airport configurations, while also lowering alarm rates, increasing throughput, and improving detection capabilities. These enhancements to our checked baggage explosives detection capability fall under what we term the "Next Generation EDS - Phoenix Project." In addition to this applied R&D, TSA is also undertaking basic R&D to explore emerging and revolutionary new technologies under the "Next Generation EDS – Manhattan II" project. The purpose of Manhattan II is to evaluate and develop next generation EDS technology and to challenge industry and academia to apply innovation in the development of new screening systems. Under

Manhattan II, TSA has issued ten multiple proof-of-concept grants, totaling approximately $10 million in FY 2004 and FY 2005, which includes the following:

Technology Area	Vendor	Project Description
TeraHertz	L3 Communications	THz Time Domain Spectroscopy
	TeraView	Applying THz to Checked Baggage Screening
Neutron	SAIC	Neutron-based system for Alarm Resolution
	HiEnergy	Stoichoimetric Explosive Detection & Confirmation
Trace Detection	CyTerra	Pressure Activated Sampling System-Luggage (PASS-L)
	Nomadics	Amplified Fluorescence Quenching
X-Ray	Smiths Detection	Coherent Scatter with CT imaging
	Analogic	Threaded Dual Axis Tomosysthesis (TDAT)
	General Electric	Stationary X-Ray Source (CT)
	Xintek	Nanotechnology Based X-Ray Imaging

Upon completion of the proof-of-concept phase, TSA will evaluate the results and award system development contract(s) to those organizations with concepts and technologies that are proven and demonstrated. It should be emphasized, however, that Manhattan II is a long-term project that is not designed to yield technologies that would be deployable in the immediate future.

CONCLUSION

Subsequent to the attacks of 9/11/01, TSA successfully undertook a massive investment and effort to not only hire, train, and deploy a Federal screener workforce but to also provide them with the necessary tools to perform their duties. Given the urgency in which TSA had to operate, the aggressive deadlines set forth by Congress, and the technology that was available at the time, deployment has been challenging. As the agency matures and as airline travel levels exceed the level that existed on 9/11/01, one of our main goals is to optimize all of our resources so that security is achieved in the most cost-effective and operationally efficient manner. Developing cutting edge technologies and successfully deploying them is a key component to this optimization and is being done in close coordination with the Department of Homeland Security's Science & Technology Directorate and in partnership with technology vendors. We are developing strategic plans for both checkpoint and checked baggage screening technologies which will allow us to effectively design our road map to the future. Our efforts will focus on increasing our technological capabilities to keep pace with potential terrorists, whom we must assume are constantly examining how they can penetrate security at our Nation's airports.

Mr. Chairman, Congresswoman Sanchez, and other Members of the Subcommittee, this concludes my prepared remarks. I would be pleased at this time to answer any questions.